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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,594	01/04/2007	Hisashi Akiyama	41412	1423

52054 7590 11/24/2009

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EXAMINER	
HOFFA, ANGELA MARIE	

ART UNIT	PAPER NUMBER
3768	

NOTIFICATION DATE	DELIVERY MODE
11/24/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/599,594	AKIYAMA ET AL.	
	Examiner	Art Unit	
	Angela M. Hoffa	3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 August 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 October 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/4/07, 7/13/09, 11/12/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to communication filed on August 13, 2009.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statement filed January 4, 2007 now complies with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. Accordingly, all references listed on the information disclosure statement are being considered by the examiner.

Claim Rejections - 35 USC § 101

4. Claims 7 and 8 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility. Recording or inserting oscillation angle information during "blanking times" of the ultrasound data streams provides no utility. If ultrasound data is not being recorded, its associated oscillation angle information will have no use during the image reconstruction.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 2 and 7-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding Claims 2 and 7-8, it is not clear is what meant by "information inserted between the image data arrays" or for what purpose this step is performed. The scope of this limitation cannot be determined.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 4, 5, and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,152,294 to *Mochizuki et al*.

Mochizuki et al discloses a three-dimensional ultrasound scanner comprising an ultrasonic transducer unit with ultrasonic transducer elements arranged in an array (array transducer 30, Fig. 2); a transducer unit oscillating motor for making the ultrasonic transducer unit perform oscillation scanning in a perpendicular direction to the scanning direction of the ultrasonic beam (motor 40, Fig. 2); an oscillation angle

detection means for detecting an oscillation angle of the ultrasonic transducer unit (angle detector 44, Fig. 2); an ultrasonic transmission means for exciting the ultrasonic transducer element to form the ultrasonic beam (transmitter 104, Fig. 8); an ultrasonic receiving means for forming the ultrasonic beam from an ultrasonic echo received by the ultrasonic transducer element (receiver 106, Fig. 8) and converting the ultrasonic beam to visible image data (image processor 110, Fig. 8); an oscillation angle information adding means for adding information of the oscillation angle detected by the oscillation angle detection means to the image data outputted from the ultrasonic receiving means (Col. 7, Lines 25-32); a three-dimensional image processing means for forming a three-dimensional image based on the oscillation angle detected by the oscillation angle detection means and image data outputted from the ultrasonic receiving means (image processor 110, Fig. 8); and an image display means for displaying the three-dimensional image (CRT 112, Fig. 8).

Mochizuki et al further discloses an inherent delay means for delaying position information in the oscillation direction of the ultrasonic transducer unit by a processing time of the scanning conversion means (controller 102, Fig. 8, Col. 7, Lines 8-19) while the images are sequentially reading out the image data from a memory (memory 108, Fig. 8).

Regarding Claim 7, *Mochizuki* inherently records all data associated with its corresponding angle position. Therefore, even if a blanking time occurs, the associated oscillation angle position will record no signal.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,152,294 to *Mochizuki et al*.

Regarding Claim 2, *Mochizuki* provides the limitations as used in the rejection for Claim 1 above. However, *Mochizuki* does not expressly disclose wherein the oscillation angle information is inserted between the image data arrays.

However, the image data array of *Mochizuki* comprises image data points each corresponding to an oscillation angle (address in the memory, col. 7, lines 25-32) and recorded in a memory. Therefore, the image data points are already mapped to an oscillation angle by virtue of their recorded position within the array.

It would have been obvious to one of ordinary skill in the art at the time of invention that inserting actual oscillation angle data values into the array is equivalent to

the process as disclosed by *Mochizuki* in that the angle oscillation information is embedded into the memory and corresponds to respective image data.

The limitations of Claim 8 are discussed in the rejection of Claim 7 above.

12. Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,152,294 to *Mochizuki et al* in view of U.S. Patent No. 7,457,654 to *Raitzer et al.*

Mochizuki et al does not expressly disclose interpolating the information of the oscillation angle detected by the oscillation angle detection means.

However, *Raitzer et al* discloses a three-dimensional ultrasound imaging system wherein speed versus position information is used to interpolate the angular speed at each frame position where the velocity does not correspond to the exact same position (Col. 8, Lines 34-59). An interpolation occurs when a data point is estimated in between two other data points based on the two other data points.

It would have been obvious to one of ordinary skill in the art at the time of invention to provide a smoothing (i.e. interpolation) function to the oscillation angle information as taught by *Raitzer et al* in order to reduce noise in the data by accounting for non-ideal velocity profiles (Fig. 3 versus Fig. 4, Col. 8, Lines 34-59).

Response to Arguments

13. Applicant's arguments have been fully considered but they are not persuasive. With regards to the U.S.C. 102(b) rejection of claims over the *Mochizuki* reference,

Applicant argues that the reference does not teach a data stream having both image data arrays and oscillation angle information. Applicant admits that the reference discloses "a three-dimensional memory 108 for storing echo data (concerning a three-dimensional area) in such a manner that the three-dimensional position of the echo data corresponds to each address in the memory" (col. 7, lines 25-32). The Examiner takes the position that this disclosure by *Mochizuki* is sufficient to meet the claim limitation since an address in a data array that corresponds to a position within a three-dimensional space inherently includes angle information. Just because the reference does not expressly record the value of the angle into its own position within the data array does not mean that the data array lacks angle information. Furthermore, if the data array of *Mochizuki* did not record angle information, the image reconstruction could not occur (i.e. position data is necessary to reconstruct an ultrasound image from echo data).

14. With regard to amended Claim 2, Applicant further argues that the limitation of "to insert oscillation angle information between image data arrays" in not present within the *Mochizuki* reference. The Examiner agrees and has issued a new rejection in light of the amendment to the claim.

15. With regard to Claim 4, Applicant argues that the limitations associated with a "delay means" are not met by the *Mochizuki* reference. However, the claim language does not specify what "position information" is delayed and what the "processing time" is measuring (i.e. the creating of image data, the reading out of image data, the outputting of image data, etc.). The *Mochizuki* reference certainly teaches a

synchronization of timing of the outputted image data with the oscillation position information – otherwise the data would not produce an accurate reconstructed image. Reading broadly, since the processor synchronizes the data and position, a delay means is inherently present within the processor in order to perform the synchronization. The controller of *Mochizuki* performs the timing of the movement of the ultrasound array and therefore qualifies as the "delay means".

16. Regarding Claim 5, Applicant argues that the limitation of "writing position information in the oscillation direction of the ultrasonic transducer unit in the frame memory" is not met by the *Mochizuki* reference. However, the Examiner uses the same reasoning as in the argument for Claim 1 above. The echo data position within the memory corresponds to an oscillation angle position, and therefore, both the echo data position and oscillation angle position are recorded in the memory.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent Nos. 7,285,094 to Nohara, 6,780,153 to Angelsen, and 6,645,151 to Irioka disclose oscillation angle measuring ultrasound transducer devices and read on aspects of the claimed invention.

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Angela M. Hoffa whose telephone number is 571-270-7408. The examiner can normally be reached on Monday - Friday, 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. M. H./
Examiner, Art Unit 3768

/Long V Le/
Supervisory Patent Examiner, Art Unit 3768